Volume : III Revision Date : 10/16/1980
Chapter : 2 Subject : **PROCEDURE FOR DETERMINING RATE OF APPLICATION FOR LIME TREATMENT**
Section : 2
Directive : 2

1. **PURPOSE**. The purpose of this directive s to establish a uniform procedure for determining the rate of application for various types of lime used in the treatment of soils and base course materials.

2. **SCOPE**. This directive outlines the procedures to be followed by personnel responsible for calculating the rate of application (spread) for lime treatment of soils and base course materials, regardless of the type of lime used for Office of Highways and Office of Aviation projects.

3. **PROCEDURE**. The percent by volume of lime for treatment will be specified in the contract, on the plans, or by test report. There are two basic types of lime acceptable for use; hydrated lime and quicklime. Only lime from approved sources listed on the current Qualified Products List (QPL) may be used on DOTD projects, unless otherwise specified in the contract. Since hydrated lime and quicklime are equally reactive based on comparable weights used for treatment, their application rates are based on the unit weight of hydrated lime, 35 pounds per cubic foot. Therefore, a transport with a certain net weight of lime will have the same spread coverage, regardless of whether the load is hydrated lime or quicklime.

   The chart which follows shows the volume-weight relationship that is to be used for all hydrated limes and quicklimes, except calcined shell, regardless of their actual unit weight. The chart is based on an assumed unit weight of 35 pounds per cubic foot. The procedure for calcined shell quicklime is outlined in 3.D. of this procedure.

   A. **QUANTITY OF LIME REQUIRED PER CUBIC FOOT OF TREATMENT**

RATE SPECIFIED IN CONTRACT OR PLANS (BY VOLUME)	POUNDS OF LIME PER CUBIC FOOT OF TREATMENT
1%	0.35
2%	0.70
3%	1.05
4%	1.40
5%	1.75
6%	2.10
7%	2.45
8%	2.80
9%	3.15
10%	3.50

   An example of calculating a spread for lime treatment follows:

B. GIVEN:

1. The Special Provisions specify that a portion of the top of the embankment as shown on the plans shall be treated with 5% lime by volume.

2. The plans indicate that the top 6 inches of the embankment are to be treated to a width of 26 feet as shown by typical section.

3. The net weight of lime in the transport is 40,000 pounds.

4. The unit weight of lime is 35 Ibs./ft.3. (This is assumed for both hydrated and quicklime.)

C. CALCULATIONS:

1. Volume to be treated per linear foot (Vlf)
   Vlf = 0.5' x 26'
   = 13 cubic feet

2. Weight of lime required per linear foot (Wlf)
   Wlf= 13 Cu. ft. x 1.75 lbs. (from the chart)
   = 22.75 pounds

3. Spread distance

$$\text{Spread} = \frac{40{,}000 \text{ lbs.}}{22.75 \text{ Ibs./linear foot}}$$

$$= 1758 \text{ linear foot}$$

D. CALCINED SHELL QUICKLIME:

In the event the contractor proposes to use calcined shell quicklime from on approved source on the DOTD QPL, a sample of this material shall be submitted to the Materials Laboratory prior to use on the job, for determination of the rate of application. The inspector should be aware that calcined shell quicklime usually requires longer mellowing periods and more manipulation than do other types of lime. Material treated with calcined shell should be examined after 48 and 72 hour intervals following mixing to assure that the desired soil-lime reaction is taking place. The inspector should examine the mixture to determine if the soil is easily crumbled and if the shell particles have dissolved due to reaction. If this condition hasn't occurred, additional mellowing and manipulation should be accomplished until sufficient reaction has occurred.

4. **OTHER DIRECTIVES AFFECTED**. All directives, memoranda or instructions issued heretofore in conflict with this directive are hereby rescinded.

5. **EFFECTIVE DATE**. This procedure will be effective immediately upon receipt.

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